



Research to Applications: Addressing Natural Resource and Human Health Hazards on the Coast

Susan White, Ph.D.
Director, Hollings Marine Laboratory & NOAA Center of
Excellence in Oceans and Human Health
National Centers for Coastal Ocean Science
National Ocean Service

(843) 762-8993 Susan.White@noaa.gov



Presentation Overview

- NCCOS: Who we are and what we do
- Example Research Efforts Addressing Natural Resource and Human Health Hazards on the Coast
- Partnership Opportunities

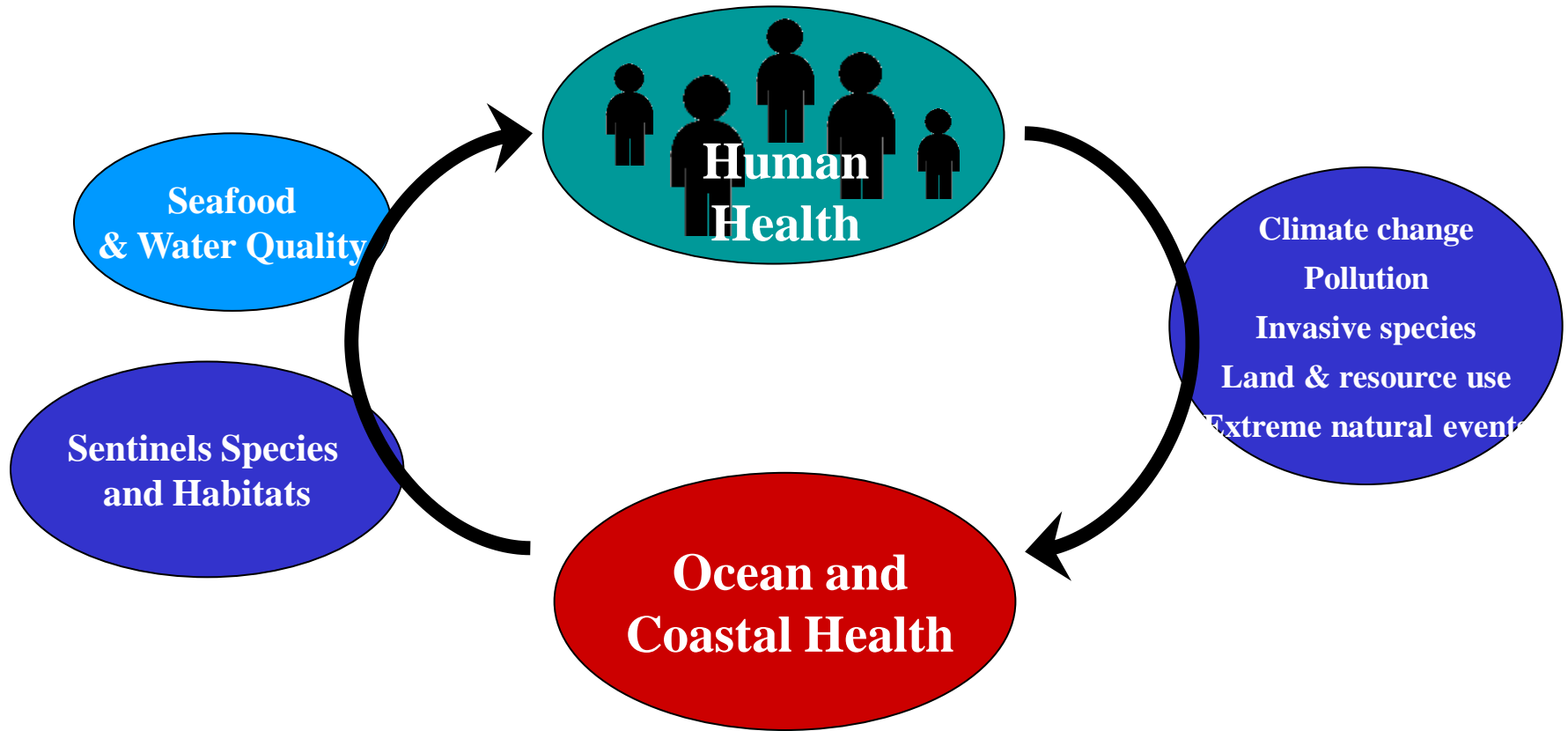
NCCOS: Who we are

- NCCOS is the primary coastal science organization supporting NOAA's Ocean Service
- We focus on applied research to translate complex scientific data into useful information for coastal managers
- We have diverse expertise that integrate multiple disciplines to answer relevant management questions
- We have the capability to address problems at multiple spatial scales: national – regional – state
- We are product and customer focused

NCCOS Organization



- Created in 1999 as the focal point for NOAA's coastal ocean science
- Five Centers including two satellite labs + extramural research
- Oceans and Human Health Initiative (OHHI) added in 2011



NOAA'S Oceans and Human Health Initiative



**OCEANS & HUMAN
HEALTH INITIATIVE**

*A Healthy Ocean for
Healthy People*



Research Priorities

- Science to reduce **POLLUTION** for improved coastal and ocean health
- Science to manage threats of **HARMFUL ALGAL BLOOMS**
- Model and predict **CLIMATE CHANGE IMPACTS** to coastal ecosystems
- Science to support **COASTAL AND MARINE SPATIAL PLANNING**





- Land Use Changes and the Coast: Sentinels of Environmental and Human Health
- Deepwater Horizon Response and Research
- Climate Change Impacts

Urbanization in Coastal Ecosystems

- Globally > 55% of the world's population lives within 50 miles of the coast
- Half of the US population reside within 50 miles of the coast, which occupies less than 11% of the land area of the lower 48 states
- Greatest rate of population change has been in the southeastern US (58% increase) followed by the Pacific (46%) & Gulf of Mexico (45%)



Impacts of Coastal Development on Marine Ecosystems and Human Health

This influx of people into the coastal zone has:



Altered hydrography
& increased flooding

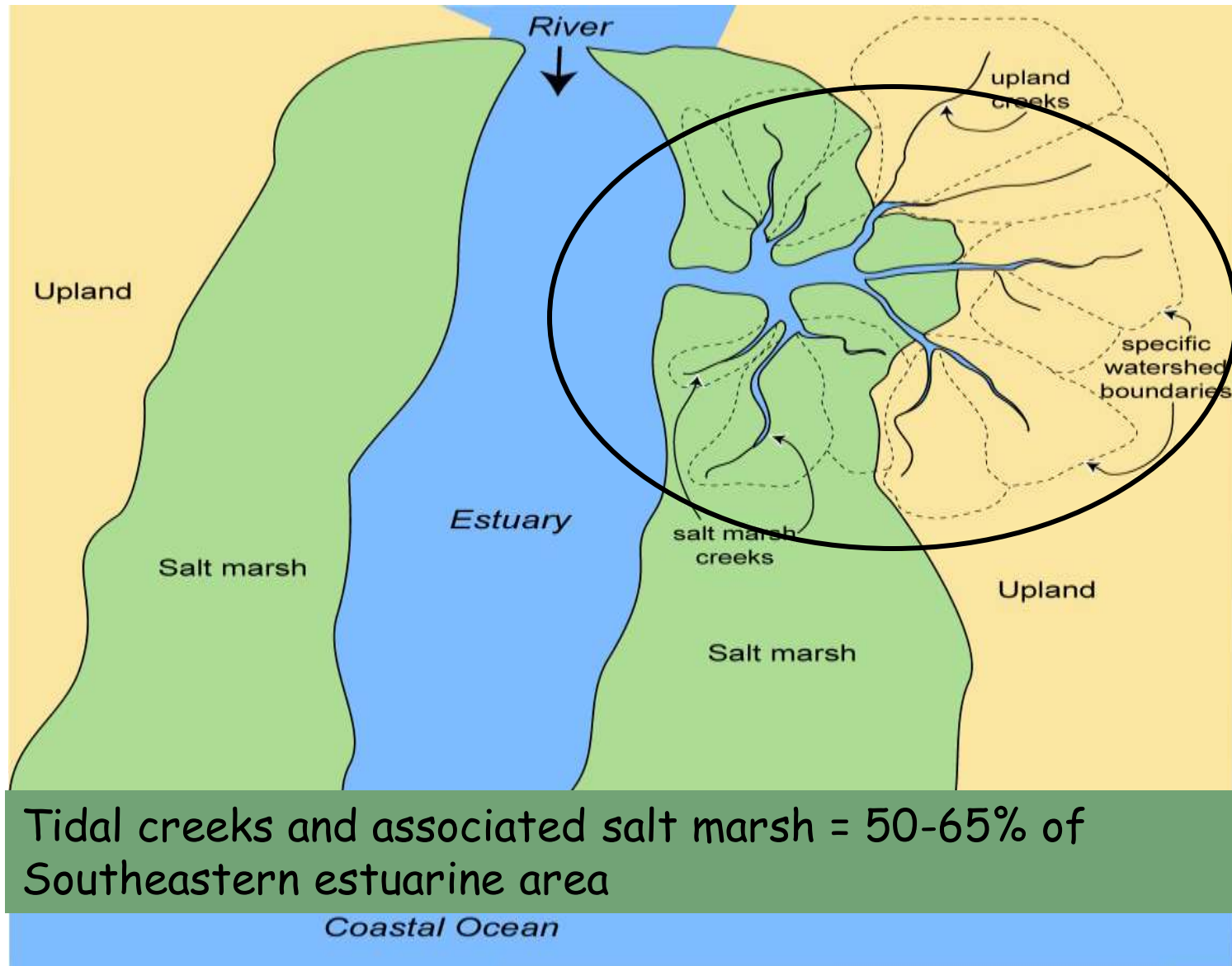


Contaminated
seafood & beaches



Impaired ecosystems
(e.g. eutrophication,
hypoxia)

Sentinel Habitats

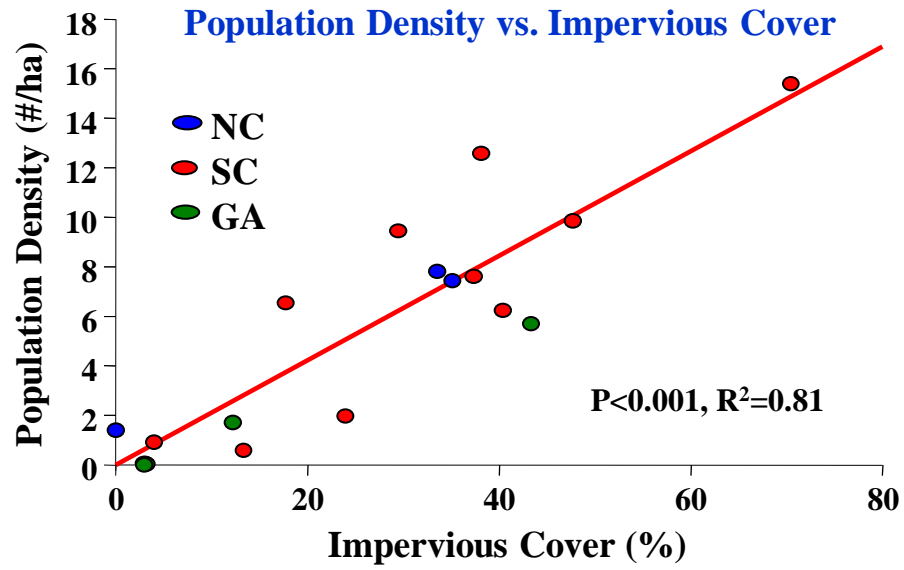


Tidal creeks and associated salt marsh = 50-65% of Southeastern estuarine area

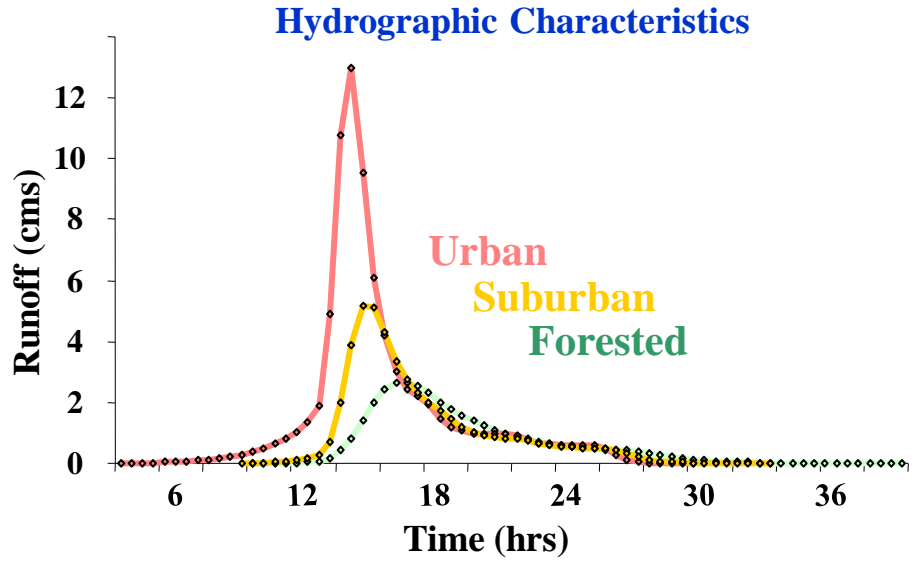


Sentinel Habitats

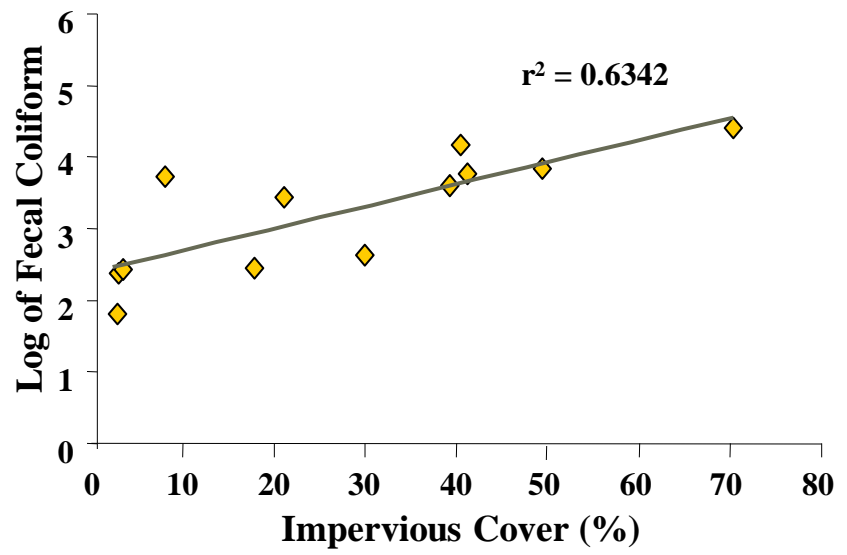
Population Density vs. Impervious Cover



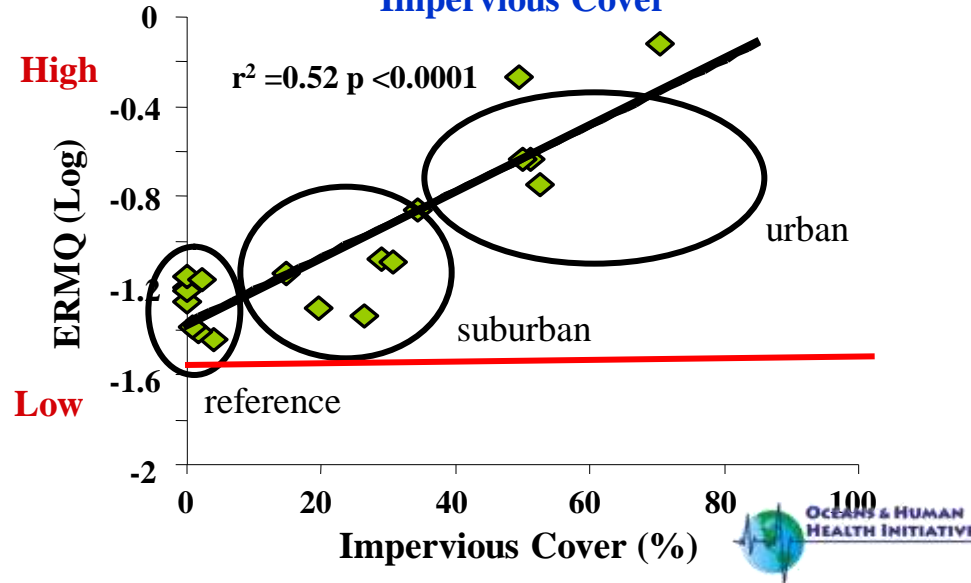
Hydrographic Characteristics



Fecal Bacteria vs. Impervious Cover

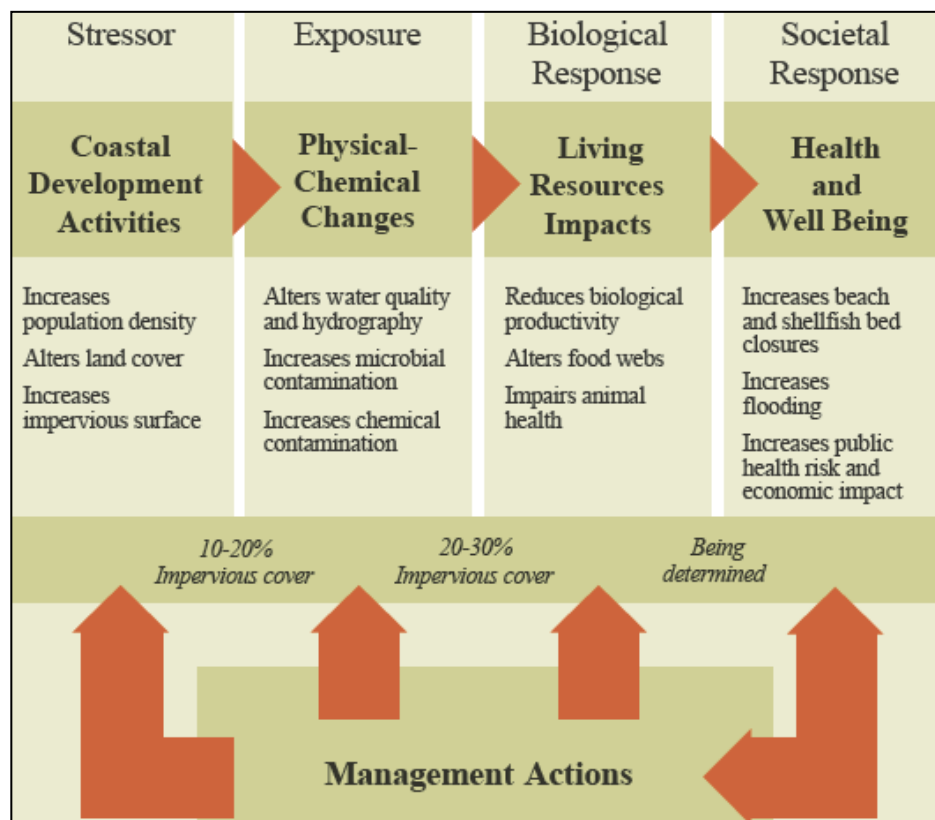


Chemical Contamination vs. Impervious Cover



Sentinel Habitats: Land Use Impacts Coastal Health

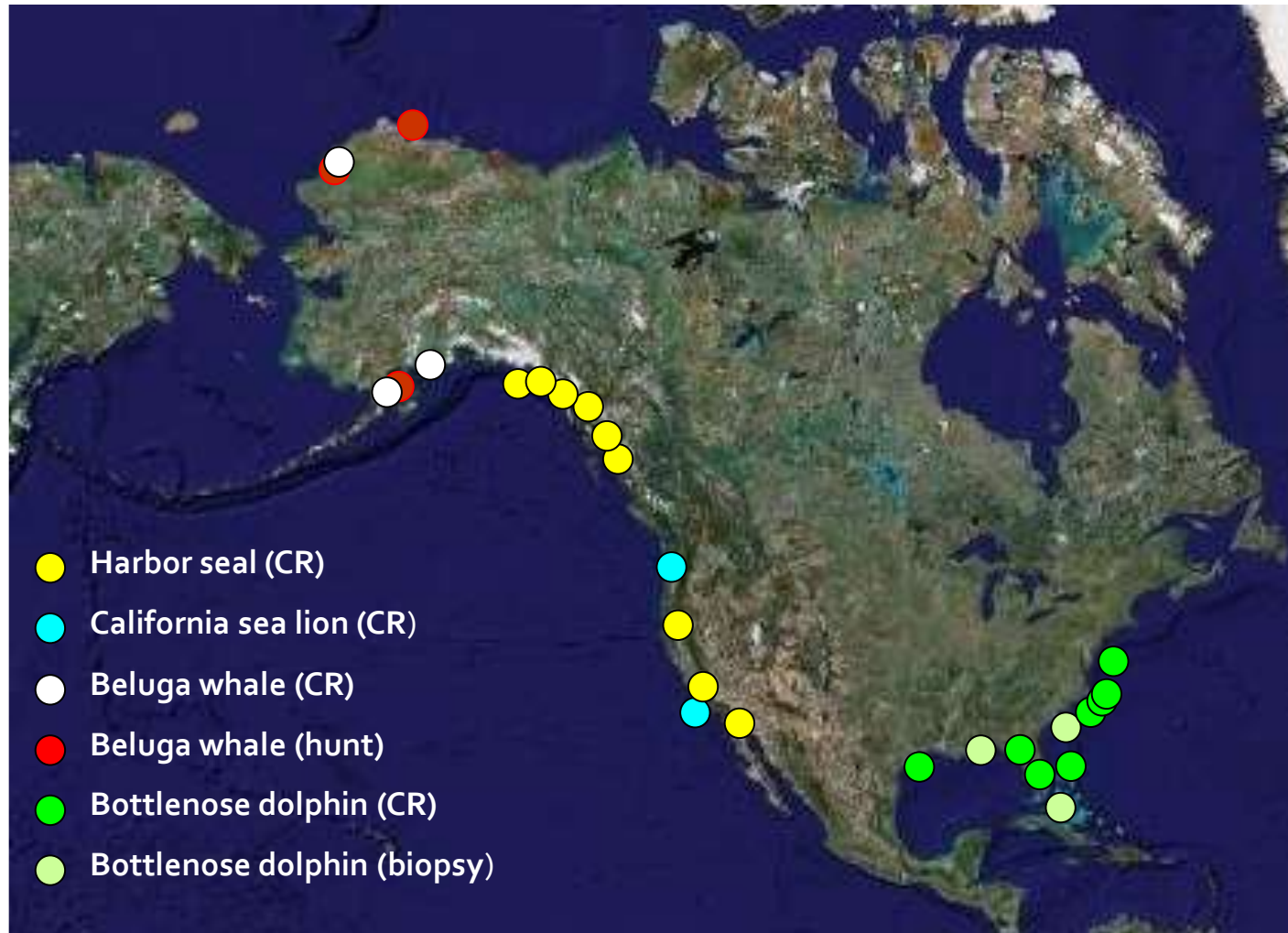
- Extensive sampling in coastal southeast and Gulf of Mexico creeks shows link between pollution and land use (level of impervious cover), and supports use of tidal creeks as sentinel habitats.
- Framework to predict impact of coastal development on estuarine system will be a decision-support tool for coastal zone managers and land use planners.



Sentinel Species

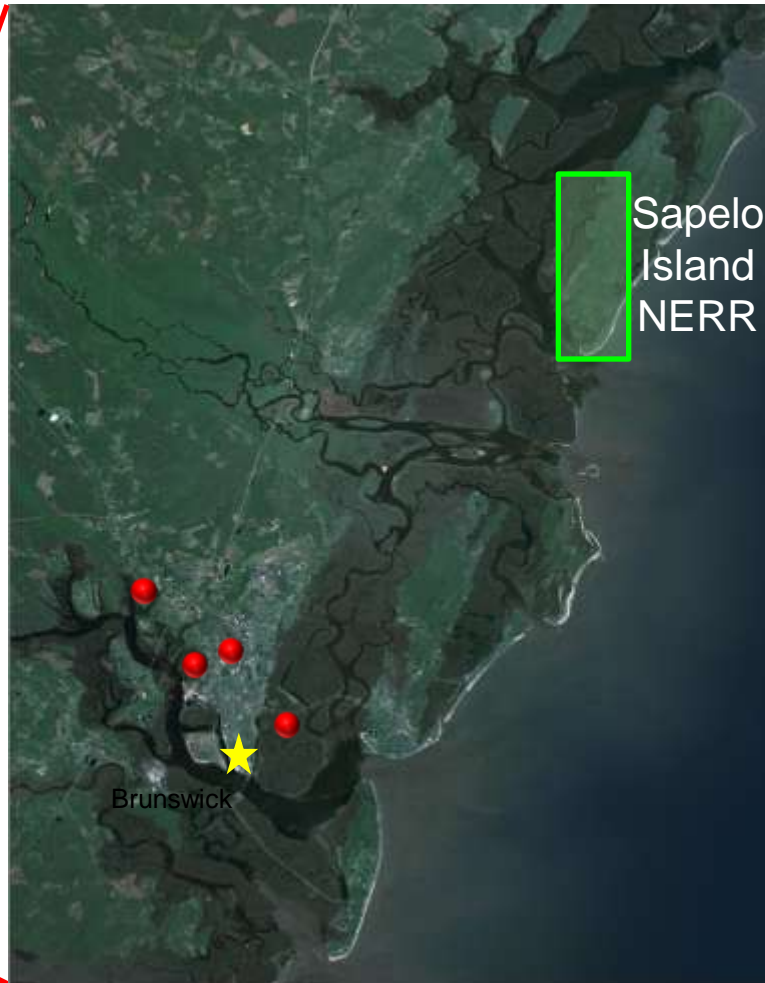


Sentinel Species



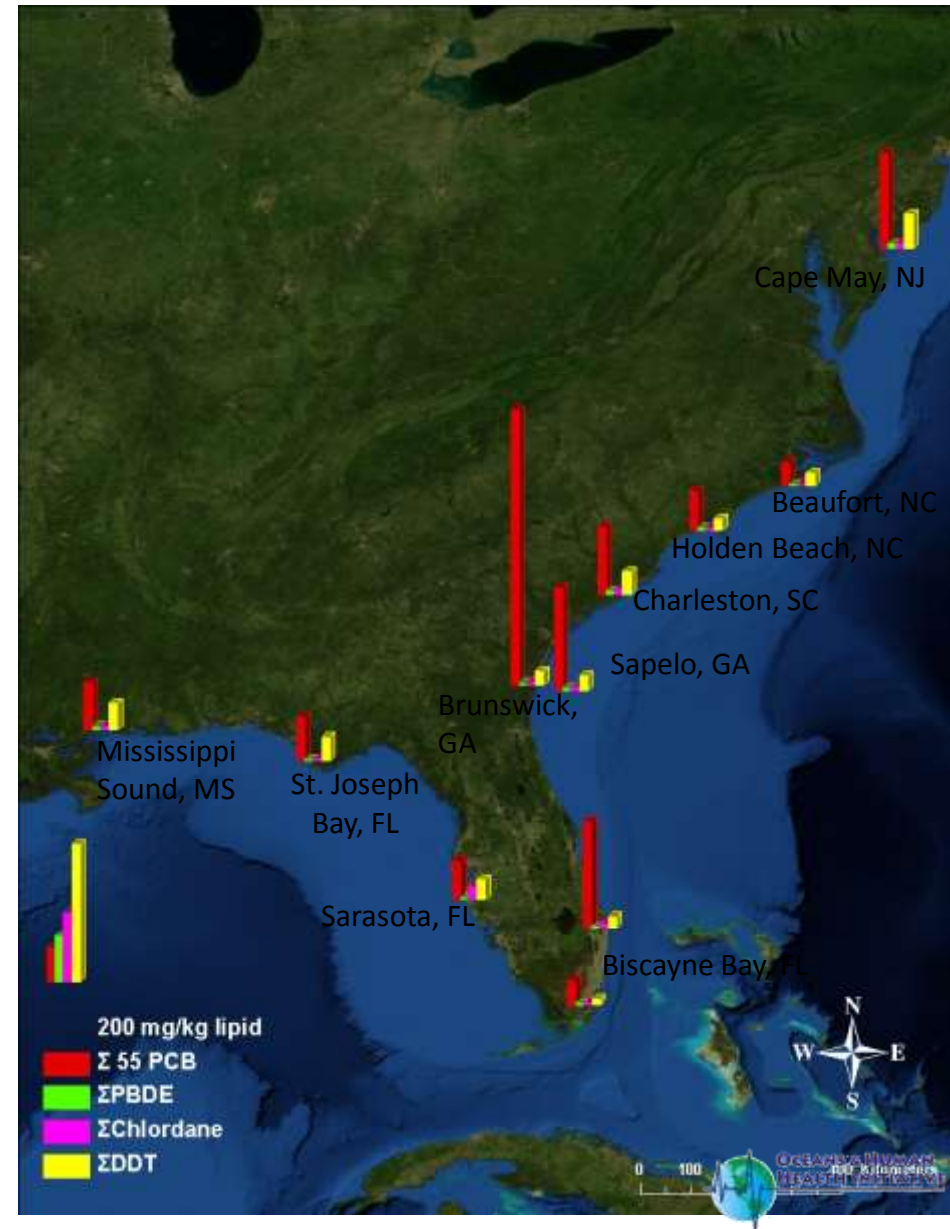
Independent studies for stock assessment, Unusual Mortality Events (UME) investigation, health assessments

Study Site: Georgia Coast, U.S.



Sentinel Species

- Record high levels of PCBs in dolphins from Brunswick estuaries
- High PCBs with similar congener pattern in dolphins from Sapelo Island NERR
- Suggest contaminants being dispersed through coastal food web
- Significant health impacts (endocrine, immune) associated with PCB exposures



What does this mean for human health?

- Additional studies underway
 - Analysis of PCBs in prey
 - Pilot study with CDC/NCEH to examine commonality in coastal dolphin & human exposures





National Environmental Public Health Tracking System

D H E C South Carolina Department of Health and Environmental Control
We promote and protect the health of the public and the environment.

Health Environment Services Permits Regulatory A-Z

EPHT Home
About EPHT
News & Resources
Definitions
FAQs

Content Areas
Air Quality
Birth Defects
Cancer
Carbon Monoxide (CO)
Childhood Lead
Coastal Environment
Drinking Water Quality
Hospitalization
Mothers & Babies

TRACK IT. MAP IT. USE IT.
SC Environmental Public Health Tracking

My Health & Environment - Environmental Public Health Tracking

Coastal Environment

Click on the topic below or on the numbers in the image for more info.

1 Advisories Contaminant, Fish, Tide, Shellfish, Weather, Fish...	2 Water Quality Swimming Advisories, Beach, Realtime and Historical Data...	3 Weather Hurricane Weather, Storm Information and Advisories...
4 Air Quality Fog, Cloud, Rain, Storm, Index, Smog...	5 Fishing/Shellfish Fish Advisories, Fish Watch, Total Catch...	6 Seafood Advantages of Eating Seafood, Safe Handling of Seafood...
7 Tidal Creeks Tidal Creek, SC Estuaries and Coastal Resource Program...	8 Life on the Coast Advisories, SC Data, Tide Tables...	9 Marine Life Health Dolphins, Manatee, Water, Sentinel Species Research...
10 Litter Prevention Pet Waste, Trashage, Adopt-A-Beach, Clean Marine...	11 Beach Preservation Protection, Erosion and Re-Nourishment...	12 Wildlife Conservation Sea Turtles, Birds, Mammals, Insects...

Daily allergy forecast



National Status and Trends Program

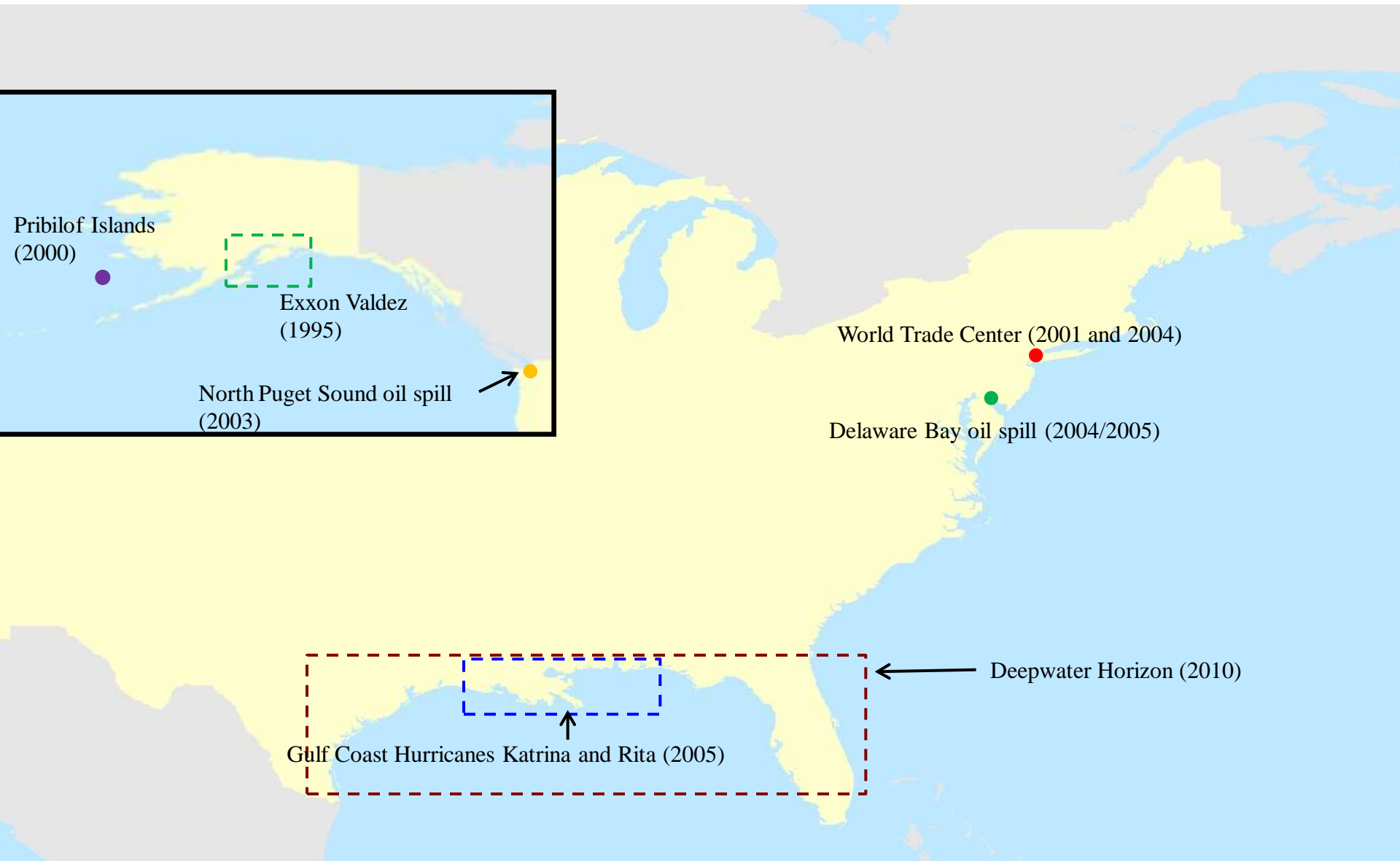
➔ National Status & Trends

Mussel Watch & Bioeffects Programs

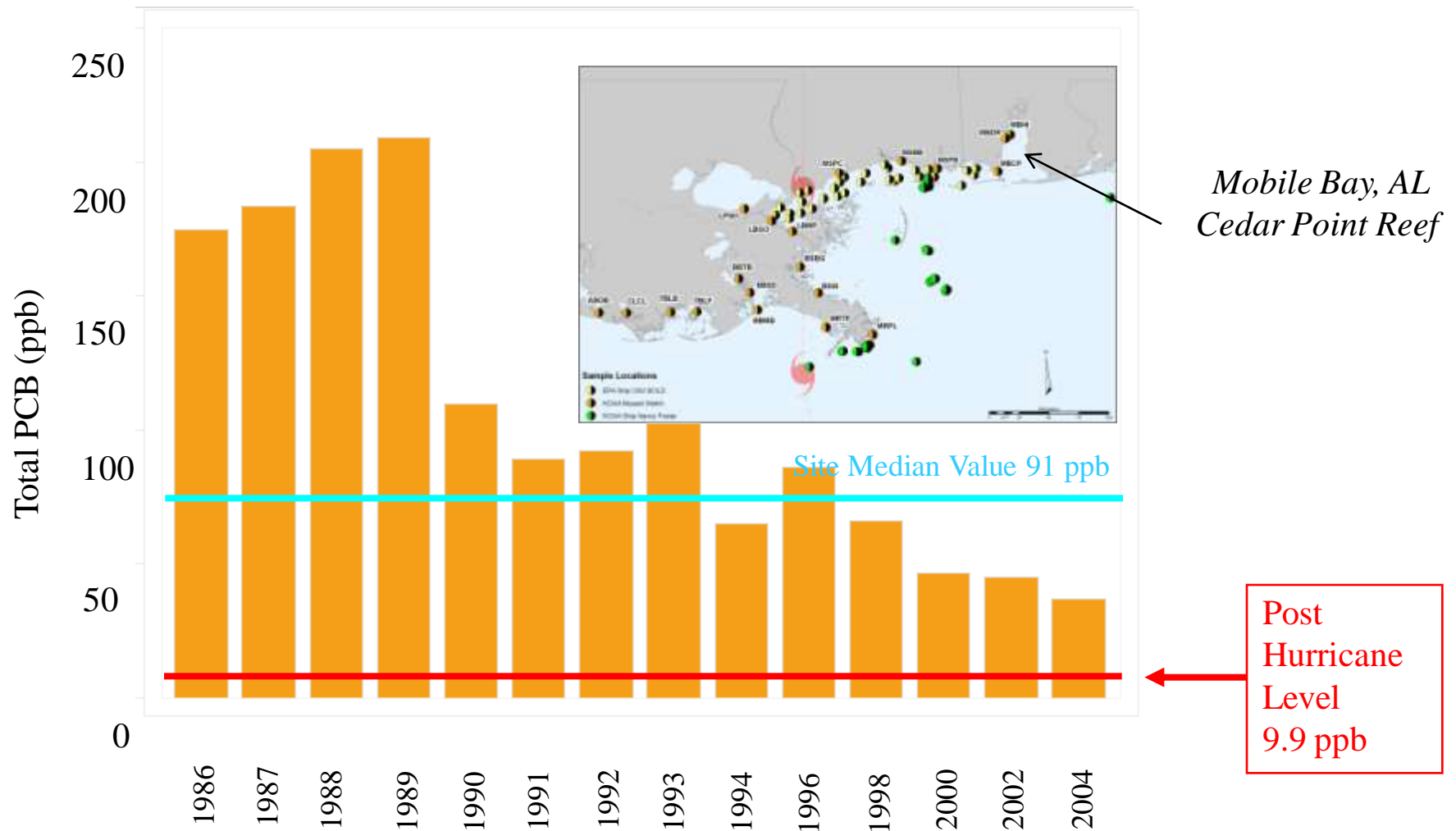
- ➔ 280 sites nationwide monitored annually for 120 contaminants: legacy contaminants and contaminants of emerging concern (CECs)
- ➔ Nation's longest running coastal contaminant monitoring program (26 years)
- ➔ Comprehensive assessments of environmental contamination, toxicity, and biological community condition in bays and estuaries

Mussel Watch Sites | Bioeffects Assessment Locations

Sentinels: Mussel Watch data used for hazard or spill response



Sentinels: Mussel Watch Data: : *Post Hurricane Katrina PCB Levels*



The Deepwater Horizon Disaster

NOAA's roles include:

Response

Assessment

Communication

Mitigation

Restoration



- Natural Resource Damage Assessment and Restoration Activities
- Dolphin health assessments



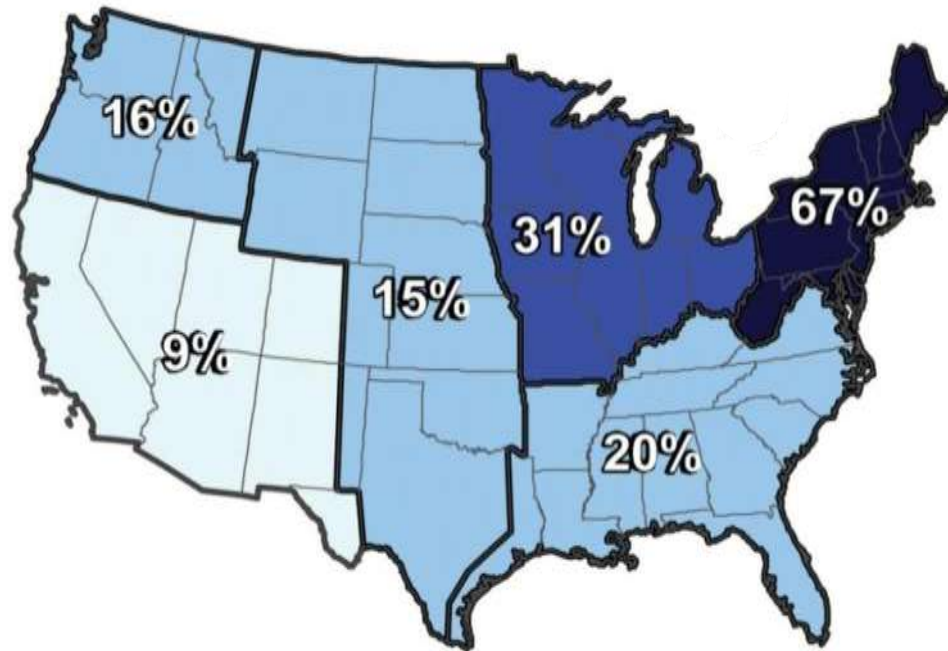
Health and Well-being in Coastal Counties: Impact and Resiliency in the Wake of the Deepwater Horizon Industrial-Environmental Disaster

- ✓ *Enhance management and conservation practices to reduce impacts from contaminants*
- ✓ *Determine changes in human health and well-being due to impacts of pollution on environmental health and ecosystem services*



Climate Change Impacts

Climate change models predict increases in **frequency** and **intensity** of heavy precipitation events



Develop models to predict response of marshes to SLR and anthropogenic impacts

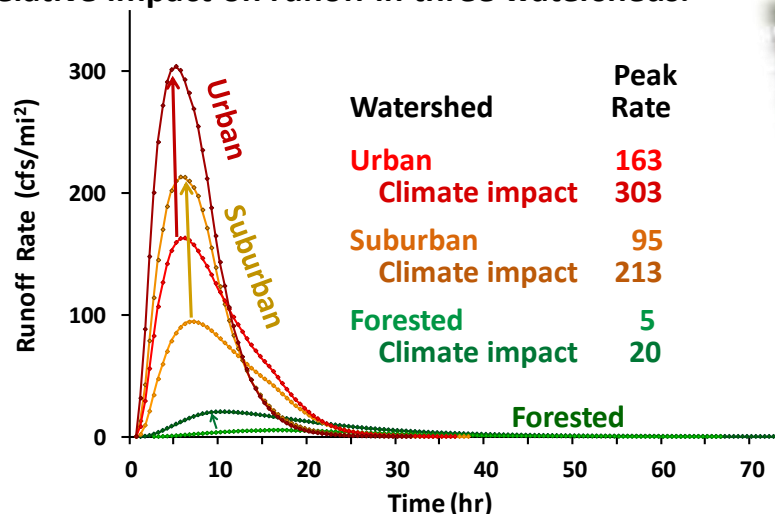


<http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/full-report/national-climate-change>
Accessed 5/24/2010

Modeling impact of changing precipitation patterns on stormwater runoff

- Quantifying stormwater runoff within a context of climate change and variability scenarios leads to better-informed decisions related to minimizing impacts at local scales.
- Modeling system provides tools for use by research scientists, coastal managers, educators, and outreach professionals.

Climate scenario based on predictions of increased frequency and intensity of heavy rains shows relative impact on runoff in three watersheds.



24-hr 4.5-in storm event, normal runoff conditions
Climate impact – 12-hr 5.2-in storm event, semi-wet conditions



Climate Change Impacts: Sea Level Rise

Integrating storm surge and ecological models for more precise predictions of how future sea level will affect coastal wetlands, submerged aquatic vegetation, subtidal habitat and oyster reefs.

Examining ecological and socioeconomic costs and benefits of shoreline erosion and protection alternatives.

Assessing efficacy of shoreline stabilization and developing shoreline protection plans.



Partnership opportunities

- User's awareness in exploring environmental health/human health hazards and response preparedness
- Engagement
 - Matching user requirements to NCCOS capabilities
 - Jointly developing workplan focused on deliverables
 - Ensuring products meet user requirements and user needs
- Regional coordination – economies of scale

